PHYSICS DEPT. LIBRARY

TABLE OF CONTENTS

PAGE

OFFICERS AND MEMBERS OF THE ACADEMY, NOVEMBER 15, 1915 x
REPORT OF THE ANNUAL MEETING, APRIL, 1916 300
AWARD OF MEDALS 307
RESEARCH GRANTS FROM THE TRUST FUNDS OF THE ACADEMY 307, 743
PRELIMINARY REPORT UPON THE POSSIBILITY OF CONTROLLING THE LAND SLIDES ADJACENT TO THE PANAMA CANAL 193
SYMPOSIUM ON THE EXPLORATION OF THE PACIFIC 391
REPORT OF THE AUTUMN MEETING, NOVEMBER, 1916 744
NOTICES OF BIOGRAPHICAL MEMOIRS 737
INDEX 751
ERRATA 192

NATIONAL RESEARCH COUNCIL

PAGE

PRELIMINARY REPORT OF THE ORGANIZING COMMITTEE TO THE PRESIDENT OF THE ACADEMY 507
REPORT OF THE FIRST MEETING OF THE COUNCIL 602
REPORTS OF THE MEETINGS OF THE EXECUTIVE COMMITTEE 605, 738
ORGANIZATION OF THE RESEARCH COUNCIL 607
REPORT OF THE SECOND MEETING OF THE COUNCIL 738
SCIENTIFIC RESEARCH FOR NATIONAL DEFENSE AS ILLUSTRATED BY THE PROBLEMS OF AERONAUTICS (ABSTRACT) ..... *By Lieut. Col. George O. Squier, U. S. A.* 740

MATHEMATICS

PAGE

UPPER LIMIT OF THE DEGREE OF TRANSITIVITY OF A SUBSTITUTION GROUP *By G. A. Miller* 61
AN EXTENSION OF FEUERBACH'S THEOREM ..... *By F. Morley* 171
DEFORMATIONS OF TRANSFORMATIONS OF RIBAUCOUR ..... *By L. P. Eisenhart* 173
ON THE LINEAR DEPENDENCE OF FUNCTIONS OF SEVERAL VARIABLES, AND CERTAIN COMPLETELY INTEGRABLE SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS .... *By Gabriel M. Green* 209
POINT SETS AND ALLIED CREMONA GROUPS (PART II) ..... *By Arthur B. Coble* 244
ON A THEOREM OF LUCAS ..... *By M. B. Porter* 247
INTERPRETATION OF THE SIMPLEST INTEGRAL INVARIANT OF PROJECTIVE GEOMETRY *By E. J. Wilczynski* 248
ON THE FOUNDATIONS OF PLANE ANALYSIS SITUS ..... *By Robert L. Moore* 270
A GENERAL THEORY OF SURFACES ..... *By Edwin B. Wilson and C. L. E. Moore* 273
DIFFERENTIAL EQUATIONS AND IMPLICIT FUNCTIONS IN INFINITELY MANY VARIABLES *By William L. Hart* 309
NOTE ON LUCAS' THEOREM ..... *By M. B. Porter* 335
A VARIABLE SYSTEM OF SEVENS ON TWO TWISTED CUBIC CURVES .... *By H. S. White* 337
A PROOF OF WHITE'S PORISM ..... *By A. B. Coble* 530
ON CERTAIN ASYMPTOTIC EXPRESSIONS IN THE THEORY OF LINEAR DIFFERENTIAL EQUATIONS ..... *By W. E. Milne* 543
ON NEWTON'S METHOD OF APPROXIMATION ..... *By Henry B. Fine* 546
POINT SETS AND CREMONA GROUPS (PART III) ..... *By Arthur A. Coble* 575
SOME PROBLEMS OF DIOPHANTINE APPROXIMATION: A REMARKABLE TRIGONOMETRICAL SERIES ..... *By G. H. Hardy and J. E. Littlewood* 583

209690

PAGE

NEWTON'S METHOD IN GENERAL ANALYSIS.....By Albert A. Bennett 592
A SET OF INDEPENDENT POSTULATES FOR CYCLIC ORDER, By Edward V. Huntington 630
CERTAIN GENERAL PROPERTIES OF FUNCTIONS.....By Henry Blumberg 646

ASTRONOMY

PAGE

A POSSIBLE ORIGIN FOR SOME SPIRAL NEBULAE.....By George F. Becker 1
STUDIES OF MAGNITUDES IN STAR CLUSTERS, I. ON THE ABSORPTION OF LIGHT IN SPACE.....By Harlow Shapley 12
STUDIES OF MAGNITUDES IN STAR CLUSTERS, II. ON THE SEQUENCE OF SPECTRAL TYPES IN STELLAR EVOLUTION.....By Harlow Shapley 15
ON THE ALBEDO OF THE PLANETS AND THEIR SATELLITES.....By Henry Norris Russell 74
THE MINUTE STRUCTURE OF THE SOLAR ATMOSPHERE.....
By George E. Hale and Ferdinand Ellerman 102
MONOCHROMATIC PHOTOGRAPHY OF JUPITER AND SATURN.....By R. W. Wood 109
ON THE OBSERVED ROTATIONS OF A PLANETARY NEBULA.....
By W. W. Campbell and J. H. Moore 129
A SHORT PERIOD CEPHEID WITH VARIABLE SPECTRUM.....By Harlow Shapley 132
THE SPECTRUM OF δ CEPHEI.....By Walter S. Adams and Harlow Shapley 136
INVESTIGATIONS IN STELLAR SPECTROSCOPY, I. A QUANTITATIVE METHOD OF CLASSIFYING STELLA SPECTRA.....By Walter S. Adams 143
INVESTIGATIONS IN STELLAR SPECTROSCOPY, II. A SPECTROSCOPIC METHOD OF DETERMINING STELLAR PARALLAXES.....By Walter S. Adams 147
INVESTIGATIONS IN STELLAR SPECTROSCOPY, III. APPLICATION OF A SPECTROSCOPIC METHOD OF DETERMINING STELLAR DISTANCES TO STARS OF MEASURED PARALLAX
By Walter S. Adams 152
INVESTIGATIONS IN STELLAR SPECTROSCOPY, IV. SPECTROSCOPIC EVIDENCE FOR THE EXISTENCE OF TWO CLASSES OF M TYPE STARS.....By Walter S. Adams 157
DISCOVERY OF EIGHT VARIABLE STELLAR SPECTRA.....By Harlow Shapley 208
SYSTEMATIC MOTION AMONG STARS OF THE HELIUM TYPE.....By Benjamin Boss 214
THE SITUATION IN REGARD TO ROWLAND'S PRELIMINARY TABLE OF SOLAR SPECTRUM WAVE-LENGTHS.....By Charles E. St. John 226
CHANGES IN THE FORM OF THE NEBULA N. G. C. 2261.....By Edwin P. Hubble 230
ON SOME RELATIONS BETWEEN THE PROPER MOTIONS, RADIAL VELOCITIES, AND MAGNITUDES OF STARS OF CLASSES B AND A.....By C. D. Perrine 289
ASYMMETRY IN THE PROPER MOTIONS AND RADIAL VELOCITIES OF STARS OF CLASS B AND THEIR POSSIBLE RELATION TO A MOTION OF ROTATION....By C. D. Perrine 292
THE PYRANOMETER: AN INSTRUMENT FOR MEASURING SKY RADIATION.....
By C. G. Abbot and L. B. Aldrich 333
THE WORK OF THE AMERICAN METEOR SOCIETY IN 1914 AND 1915.....
By Charles P. Olivier 372
AN APPARENT DEPENDENCE OF THE APEX AND VELOCITY OF SOLAR MOTION, AS DETERMINED FROM RADIAL VELOCITIES, UPON PROPER MOTION..By C. D. Perrine 376
PRELIMINARY EVIDENCE OF INTERNAL MOTION IN THE SPIRAL NEBULA MESSIER 101
By A. van Maanen 386
ON THE SUGGESTED MUTUAL REPULSION OF FRAUNHOFER LINES.....
By Charles E. St. John 458
THE ROTATION AND RADIAL VELOCITY OF THE SPIRAL NEBULA N. G. C. 4594.....
By Francis G. Pease 517
A SIMPLE METHOD FOR DETERMINING THE COLORS OF THE STARS.....
By Frederick H. Seares 521
STUDIES OF MAGNITUDES IN STAR CLUSTERS, III. THE COLORS OF THE BRIGHTER STARS IN FOUR GLOBULAR SYSTEMS.....By Harlow Shapley 525

PAGE

PRELIMINARY RESULTS ON THE COLOR OF NEBULAE ..... *By Frederick H. Seares* 553
SPECTROGRAPHIC OBSERVATIONS OF RELATIVE MOTIONS IN THE PLANETARY NEBULAE *By W. W. Campbell and J. H. Moore* 566

PHYSICS AND ENGINEERING

PAGE

EXPERIMENTAL EVIDENCE FOR THE ESSENTIAL IDENTITY OF THE SELECTIVE AND NORMAL PHOTO-ELECTRIC EFFECTS ..... *By R. A. Millikan and W. H. Souder* 19
CONCOMITANT CHANGES IN TERRESTRIAL MAGNESIUM AND SOLAR RADIATION ..... *By L. A. Bauer* 24
QUANTUM RELATIONS IN PHOTO-ELECTRIC PHENOMENA ..... *By R. A. Millikan* 78
THE EMISSION QUANTA OF CHARACTERISTIC X RAYS ..... *By David L. Webster* 90
THE ELECTROMOTIVE FORCE PRODUCED BY THE ACCELERATION OF METALS ..... *By Richard C. Tolman and T. Dale Stewart* 189
THE HIGH FREQUENCY SPECTRUM OF TUNGSTEN .... *By Albert W. Hull and Marion Rice* 265
DYNAMICAL STABILITY OF AEROPLANES ..... *By Jerome C. Hunsaker* 278
THEORY OF AN AEROPLANE ENCOUNTERING GUSTS ..... *By Edwin Bidwell Wilson* 294
NOTE ON THE PHOSPHORESCENCE OF URANYL SALTS ..... *By Edward L. Nichols* 328
ON THE MOBILITIES OF GAS IONS IN HIGH ELECTRIC FIELDS .. *By Leonard B. Loeb* 345
THE LIGHT EXCITATION BY SLOW POSITIVE AND NEUTRAL PARTICLES ..... *By A. J. Dempster* 374
CHANNELED GRATING SPECTRA, OBTAINED IN SUCCESSIVE DIFFRACTIONS ..... *By C. Barus* 378
A NEW METHOD OF MEASURING THE ACCELERATION OF GRAVITY AT SEA ..... *By Lyman J. Briggs* 399
MARINE METEOROLOGY AND THE GENERAL CIRCULATION OF THE ATMOSPHERE ..... *By Charles F. Marvin* 421
THE ABSORPTION COEFFICIENTS OF SOFT X RAYS ..... *By C. D. Miller* 441
AN ATTEMPT TO DETECT THE MUTUAL INFLUENCE OF NEIGHBORING LINES IN ELECTRIC FURNACE SPECTRA SHOWING ANOMALOUS DISPERSION ..... *By Arthus S. King* 461
INTERFEROMETER METHODS BASED ON THE CLEAVAGE OF A DIFFRACTED RAY ..... *By C. Barus* 475
THE EFFECT OF AN ELECTRIC FIELD ON THE LINES OF LITHIUM AND CALCIUM ..... *By Janet T. Howell* 528
THE INTERFERENCES OF SPECTRA BOTH REVERSED AND INVERTED .. *By Carl Barus* 576
PATH DIFFERENCES WITHIN WHICH SPECTRUM INTERFERENCES ARE OBSERVED ..... *By Carl Barus* 609
NON-REVERSED SPECTRA OF RESTRICTED COINCIDENCE ..... *By Carl Barus* 614
A NEW THERMOMETER SCALE ..... *By Alexander McAdie* 670
AN IONIZATION MANOMETER ..... *By O. E. Buckley* 683

CHEMISTRY

PAGE

A PECULIAR CLAY FROM NEAR THE CITY OF MEXICO ..... *By E. W. Hilgard* 8
POLYPEPTIDE-HYDANTOINS ..... *By Treat B. Johnson* 69
THE CHEMICAL ACTIVITY OF THE IONS OF HYDROCHLORIC ACID DETERMINED BY ELECTROMOTIVE FORCE MEASUREMENTS ..... *By James H. Ellis* 83
THE ABUNDANCE OF THE ELEMENTS IN RELATION TO THE HYDROGEN-HELIUM STRUCTURE OF THE ATOMS ..... *By William D. Harkins* 216
CHANGE OF THE IONIZATION OF SALTS IN ALCOHOLIC SOLVENTS WITH THE CONCENTRATION ..... *By Frederick G. Keyes and W. J. Winninghoff* 342
SYNTHESIS OF THE BASE $C_5H_7ON_2$ DERIVED FROM METHYL-AMINOMETHYL-3,4-DIHYDROXYPHENYLCARBINOL ..... *By Charles A. Rouiller* 464

209690

PAGE

DENSITY OF RADIO-LEAD FROM PURE NORVEGIAN CLEVEITE.....
By T. W. Richards and C. Wadsworth, 3d. 505
THE ACTION OF ALKALI IN THE PRODUCTION OF LIPOLYTICALLY ACTIVE PROTEIN....
By K. George Falk 557
STERIC HINDRANCE AND THE EXISTENCE OF ODD MOLECULES (FREE RADICALS)....
By Gilbert N. Lewis 586
THE COBALTAMMINES.....*By William D. Harkins, R. E. Hall and W. A. Roberts* 598
THE EQUILIBRIUM BETWEEN ACIDS AND BASES IN SEA WATER.....
By Lawrence J. Henderson and Edwin J. Cohn 608
ELECTRICAL CONDUCTION IN DILUTE AMALGAMS.....
By Gilbert N. Lewis and Thomas B. Hine 634
THE OSMOTIC PRESSURE AND LOWERING OF THE FREEZING-POINT OF MIXTURES OF SALTS WITH ONE ANOTHER AND WITH NON-ELECTROLYTES IN AQUEOUS SOLUTIONS
By William D. Hawkins, R. E. Hall, and W. A. Roberts 642
FURTHER STUDY OF THE ATOMIC WEIGHT OF LEAD OF RADIOACTIVE ORIGIN
By Theodore W. Richards and Charles Wadsworth, 3d 694
A REVISION OF THE ATOMIC WEIGHT OF TIN
By Gregory Paul Baxter and Howard Warner Starkweather 718

GEOLOGY AND PALEONTOLOGY

PAGE

SUB-MARINE SOLUTION OF LIMESTONE IN RELATION TO THE MURRAY-AGASSIZ THEORY OF CORAL ATOLLS.....*By Alfred Goldsborough Mayer* 28
THE EXTENSION OF THE MONTANA PHOSPHATE DEPOSITS NORTHWARD INTO CANADA
By Frank D. Adams and W. J. Dick 62
THE RESULTS OF INVESTIGATIONS OF THE ECOLOGY OF THE FLORIDIAN AND BAHAMAN SHOAL-WATER CORALS.....*By Thomas Wayland Vaughan* 95
CAMBRIAN TRILOBITES.....*By Charles D. Walcott* 101
THE MECHANICS OF INTRUSION OF THE BLACK HILLS (S. D.) PRE-CAMBRIAN GRANITE
By Sidney Paige 113
ON THE FOSSIL ALGAE OF THE PETROLEUM-YIELDING SHALES OF THE GREEN RIVER FORMATION OF COLORADO AND UTAH.....*By Charles A. Davis* 114
BANDED GLACIAL SLATES OF PERMO-CARBONIFEROUS AGE, SHOWING POSSIBLE SEASONAL VARIATIONS IN DEPOSITION.....*By Robert W. Sayles* 167
GEOGRAPHIC HISTORY OF THE SAN JUAN MOUNTAINS SINCE THE CLOSE OF THE MESOZOIC ERA.....*By Wallace W. Atwood and Kirtley F. Mather* 177
THE AGE OF THE MIDDLE ATLANTIC COAST UPPER CRETACEOUS DEPOSITS.....
By W. B. Clark, E. W. Berry, and J. A. Gardner 181
UPPER CRETACEOUS FLORAS OF THE WORLD.....*By Edward W. Berry* 185
PRELIMINARY REPORT UPON THE POSSIBILITY OF CONTROLLING THE LAND SLIDES ADJACENT TO THE PANAMA CANAL..... 193
ON THE PRESENCE OF A MEDIAN EYE IN TRILOBITES.....*By Rudolph Ruedemann* 234
CLIFT ISLANDS IN THE CORAL SEAS.....*By W. M. Davis* 284
THE EXPLORATION OF THE PACIFIC.....*By W. M. Davis* 391
THE IMPORTANCE OF GRAVITY OBSERVATIONS AT SEA ON THE PACIFIC.....
By John F. Hayford 394
THE PROBLEM OF CONTINENTAL FRACTURING AND DIASTROPHISM IN OCEANICA.....
By Charles Schuchert 407
IN RELATION TO THE EXTENT OF KNOWLEDGE CONCERNING THE OCEANOGRAPHY OF THE PACIFIC.....*By G. W. Littlehales* 419
ON THE DISTRIBUTION OF PACIFIC INVERTEBRATES.....*By Wm. H. Dall* 424
MID-PACIFIC LAND SNAIL FAUNAS.....*By H. A. Pilsbry* 429

PAGE

EXTINGUISHED AND RESURGENT CORAL REEFS ..... By W. M. Davis 466
THE ORIGIN OF CERTAIN FIJI ATOLLS ..... By W. M. Davis 471
THE GEOLOGIC RÔLE OF PHOSPHORUS ..... By Eliot Blackwelder 490
DOMINANTLY FLUVIATILE ORIGIN UNDER SEASONAL RAINFALL OF THE OLD RED SANDSTONE ..... By Joseph Barrell 496
THE INFLUENCE OF SILURIAN-DEVONIAN CLIMATES ON THE RISE OF AIR-BREATHING VERTEBRATES ..... By Joseph Barrell 499
SPHENACODON MARSH, A PERMOCARBONIFEROUS THEROMORPH REPTILE FROM NEW MEXICO ..... By Samuel W. Williston 650
THE ORIGIN OF VEINS OF THE ASBESTIFORM MINERALS ..... By Stephen Taber 659
A NEW TEST OF THE SUBSIDENCE THEORY OF CORAL REEFS ..... By Reginald A. Daly 664
ON SOME ANOMALIES IN GEOGRAPHIC DISTRIBUTION OF PACIFIC COAST MOLLUSCA By William Healey Dall 700
THE EARLIEST FRESH-WATER ARTHROPODS ..... By Charles Schuchert 726

MINERALOGY AND PETROLOGY

SOME MINERALS FROM THE FLUORITE-BARITE VEIN NEAR WAGON WHEEL GAP, COLORADO ..... By Esper S. Larsen and Roger C. Wells 360
THE PETROLOGY OF SOME SOUTH PACIFIC ISLANDS AND ITS SIGNIFICANCE ..... By Joseph P. Iddings 413
A CONTRIBUTION TO THE PETROGRAPHY OF JAPAN ..... By J. P. Iddings and E. W. Morley 452
A CONTRIBUTION TO THE PETROGRAPHY OF THE PHILIPPINE ISLANDS ..... By J. P. Iddings and E. W. Morley 531

BOTANY

PAGE

THE ARCHEGONIUM AND SPOROPHYTE OF *Treubia Insignis* GOEBLE ..... By Douglas Houghton Campbell 30
RECENT EXPLORATIONS IN THE CACTUS DESERTS OF SOUTH AMERICA ..... By J. N. Rose 73
THE NATURE OF MECHANICAL STIMULATION ..... W. J. V. Osterhout 237
THE MARINE ALGAE OF THE PACIFIC ..... By W. G. Farlow 424
SOME PROBLEMS OF THE PACIFIC FLORAS ..... By Douglas H. Campbell 434
THE EXCRETION OF ACIDS BY ROOTS ..... By A. R. Haas 561
NEW DETERMINATIONS OF PERMEABILITY ..... By S. C. Brooks 569
THE OAKS OF AMERICA ..... By William Trelease 626
PHYSIOLOGICAL STUDIES ON RHIZOPHORA ..... By Howard H. M. Bowman 685

ZOOLOGY

PAGE

ON THE EFFECTS OF FEEDING PITUITARY BODY (ANTERIOR LOBE) SUBSTANCE, AND CORPUS LUTEUM SUBSTANCE TO GROWING CHICKS ..... By Raymond Pearl 50
EFFECTS OF CENTRIFUGAL FORCE ON THE POLARITY OF THE EGGS OF CREPIDULA ..... By Edwin G. Conklin 87
OBSERVATIONS ON AMEBA FEEDING ON INFUSORIA, AND THEIR BEARING ON THE SURFACE-TENSION THEORY ..... By S. O. Mast and F. M. Root 188
ON THE EFFECT OF REMOVAL OF THE PRONEPHROS OF THE AMPHIBIAN EMBRYO ..... By Ruth B. Howland 231
THE SEX OF PARTHENOGENETIC FROGS ..... By Jacques Loeb 313
THE DISTRIBUTION OF THE CHONDRIOSOMES TO THE SPERMATOZOA IN SCORPIONS ..... By Edmund B. Wilson 321
THE NEUROMUSCULAR STRUCTURE OF SEA-ANEMONES ..... By G. H. Parker and E. G. Titus 339
DIFFERENTIAL MITOSES IN THE GERM-CELL CYCLE OF DINEUTES NIGRIOR ..... By R. W. Hegner and C. P. Russell 356

The Effectors of Sea-Anemones.....By G. H. Parker 385
Nervous Transmission in Sea-Anemones.....By G. H. Parker 437
The Responses of the Tentacles of Sea-Anemones.....By G. H. Parker 438
Locomotion of Sea-Anemones.....By G. H. Parker 449
The Behavior of Sea-Anemones.....By G. H. Parker 450
A Comparison of the Rates of Regeneration from Old and from New Tissue
By Charles Zeleny 484
The Effect of Successive Removal Upon the Rate of Regeneration.....
By Charles Zeleny 487
On the Immunity Coloration of Some Nudibranchs.....By W. J. Crozier 672
The Influence of the Marginal Sense Organs on Metabolic Activity in Cassiopia Xamachana Bigelow.....By L. R. Cary 709
Observations upon Tropical Fishes and Inferences from Their Adaptive Coloration.....By W. H. Longley 733

GENERAL BIOLOGY

An Apparent Correspondence Between the Chemistry of Igneous Magmas and of Organic Metabolism.....By Henry S. Washington 623
On Volume in Biology.....By Lawrence J. Henderson 653

GENETICS

PAGE
The Numerical Results of Diverse Systems of Breeding.....By H. S. Jennings 45
A Preliminary Report on Further Experiments in Inheritance and Determination of Sex.....By Richard Goldschmidt 53
On the Degree of Inbreeding Which Exists in American Jersey Cattle.....
By Raymond Pearl and S. W. Patterson 58
Hereditary Reaction-System Relations—An Extension of Mendelian Concepts.....By R. E. Clausen and T. H. Goodspeed 240
Size Inheritance in Guinea-Pig Crosses.....By W. E. Castle 252
De Vriesian Mutation in the Garden Bean, Phaseolus Vulgaris.....
By J. Arthur Harris 317
The Effect of Parental Alcoholism (and Certain Other Drug Intoxications) Upon the Progeny in the Domestic Fowl.....By Raymond Pearl 380
On the Inheritance of Certain Glume Characters in the Cross *Avena Fatua* × *A. Sativa* var. Kherson.....By Frank M. Surface 478
Sex Intergrades in a Species of Crustacea.....By Arthur M. Banta 578
Some Effects of the Continued Administration of Alcohol to the Domestic Fowl, with Special Reference to the Progeny.....By Raymond Pearl 675

PHYSIOLOGY AND PATHOLOGY

PAGE
A Theory of Nerve-Conduction.....By Alfred Goldsborough Mayer 37
Studies of Ductless Glands by the Electrical Method.....By W. B. Cannon 319
The Relation of Myelin to the Loss of Water in the Mammalian Nervous System with Advancing Age.....By Henry H. Donaldson 350
The Processes Taking Place in the Body by Which the Number of Erythrocytes Per Unit Volume of Blood is Increased in Acute Experimental Polycythaemia.....By Paul D. Lamson 365
The Influence of Morphin Upon the Elimination of Intravenously Injected Dextrose in Dogs.....By I. S. Kleiner and S. J. Meltzer 369
Further Evidence as to the Relation Between Crown Gall and Cancer.....
By Erwin F. Smith 444

Is There a Temperature Coefficient for the Duration of Life?.....
By Jacques Loeb and J. H. Northrop 456
The Mechanism of Diffusion of Electrolytes Through Animal Membranes
By Jacques Loeb 511
Salt Antagonism in Gelatine.....*By W. O. Fenn* 534
Similarity in the Behavior of Protoplasm and Gelatin.....*By W. O. Fenn* 539
On the Hydrogen Ion Concentration of Sea Water, and the Physiological Effect of the Ions of Sea Water.....*By J. F. McClendon* 689
Some Interrelations between Diet, Growth, and the Chemical Composition of the Body.....*By Lafayette B. Mendel and Sarah E. Judson* 692
Further Studies of Nerve Conduction in Cassiopea, *By Alfred Goldsborough Mayer* 721

ANTHROPOLOGY

PAGE
Brief Notes on Recent Anthropological Explorations Under the Auspices of the Smithsonian Institution and the U. S. National Museum.....
By Aleš Hrdlička 32
Zuñi Culture Sequences.....*By A. L. Kroeber* 42
Archaelogical Explorations at Pecos, New Mexico.....*By A. V. Kidder* 119
Man and Metals.....*By Walter Hough* 123
The Failure and Revival of the Process of Pigmentation in the Human Skin
By A. E. Jenks 164
The Genetic Relations of Certain Forms in American Aboriginal Art.....
By Clark Wissler 224
Terms of Relationship and Social Organization.....*By Truman Michelson* 297
New Data on the Archaeology of Venezuela.....*By Herbert J. Spinden* 325
The Pacific as a Field for Ethnological and Archaeological Investigation....
By J. Walter Fewkes 427
New Evidence in Regard to the Instability of Human Types...*By Franz Boas* 713

PSYCHOLOGY

Personal Equation and Steadiness of Judgment in the Estimation of the Number of Objects in Moderately Large Samples.....*By J. Arthur Harris* 65
A New Method of Studying Ideational and Allied Forms of Behavior in Man and Other Animals.....*By Robert M. Yerkes* 631
Ideational Behavior of Monkeys and Apes.....*By Robert M. Yerkes* 639
Some Psycho-Physiological Processes as Affected by Alcohol..*By W. R. Miles* 703

OFFICERS AND MEMBERS OF THE ACADEMY
NOVEMBER 13, 1916

OFFICERS OF THE ACADEMY

WILLIAM H. WELCH, *President*

CHARLES D. WALCOTT, *Vice-President* — GEORGE E. HALE, *Foreign Secretary*

WHITMAN CROSS, *Treasurer* — ARTHUR L. DAY, *Home Secretary*

Additional Members of the Council

E. G. CONKLIN	J. M. COULTER	R. H. CHITTENDEN
A. A. NOYES	W. H. HOWELL	M. I. PUPIN

MEMBERS OF THE ACADEMY

ABBOT, CHARLES GREELEY.....*Smithsonian Institution, Washington, D. C.*
ABBOT, HENRY L., U. S. A.....*23 Berkeley St., Cambridge, Mass.*
ABEL, JOHN JACOB.....*Johns Hopkins University, Baltimore, Md.*
ALLEN, J. ASAPH.....*American Museum of Natural History, New York City.*
AMES, JOSEPH S.....*Johns Hopkins University, Baltimore, Md.*
BARNARD, E. E.....*Yerkes Observatory, Williams Bay, Wis.*
BARUS, CARL.....*Brown University, Providence, R. I.*
BAXTER, GREGORY PAUL.....*T. J. Coolidge Jr. Mem. Lab., Cambridge, Mass.*
BECKER, GEORGE F.....*U. S. Geological Survey, Washington, D. C.*
BELL, A. GRAHAM.....*1331 Connecticut Ave., Washington, D. C.*
BENEDICT, FRANCIS GANO.....*Nutrition Laboratory, Boston, Mass.*
BLISS, GILBERT AMES.....*University of Chicago, Chicago, Ill.*
BOAS, FRANZ.....*Columbia University, New York City.*
BOGERT, MARSTON TAYLOR.....*Columbia University, New York City.*
BÔCHER, MAXIME.....*Harvard University, Cambridge, Mass.*
BOLTWOOD, B. B.....*Yale University, New Haven, Conn.*
BOLZA, OSKAR.....*Reichsgrafenstr. 10, Freiburg, Germany.*
BRANNER, JOHN C.....*Stanford University, California.*
BRITTON, NATHANIEL LORD.....*New York Botanical Gardens, New York City.*
BUMSTEAD, HENRY ANDREWS.....*Yale University, New Haven, Conn.*
CAMPBELL. D. H.....*Stanford University, California.*
CAMPBELL, WILLIAM W.....*Lick Observatory, Mount Hamilton, California.*
CANNON, WALTER BRADFORD.....*Harvard University, Cambridge, Mass.*
CASTLE, WILLIAM ERNEST.....*186 Payson Road, Belmont, Mass.*
CATTELL, JAMES MCK.....*Garrison, N. Y.*
CHAMBERLIN, THOMAS C.....*University of Chicago, Chicago, Ill.*
CHANDLER, CHARLES F.....*Columbia University, New York City.*
CHITTENDEN, RUSSELL H.....*Sheffield Scientific School, New Haven, Conn.*
CLARK, W. B.....*Johns Hopkins University, Baltimore, Md.*
CLARKE, F. W.....*U. S. Geological Survey, Washington, D. C.*
CLARKE, J. M.....*State Hall, Albany, N. Y.*
COMSTOCK, GEORGE C.....*Washburn Observatory, Madison, Wis.*
CONKLIN, E. G.....*Princeton, N. J.*
COULTER, J. M.....*University of Chicago, Chicago, Ill.*
COUNCILMAN, WILLIAM T.....*Harvard Medical School, Boston, Mass.*
CRAFTS, JAMES M.....*19 Commonwealth Ave., Boston, Mass.*

CREW, HENRY.....*Northwestern University, Evanston, Ill.*
CROSS, WHITMAN.....*U. S. Geological Survey, Washington, D. C.*
DALL, WILLIAM H.....*Smithsonian Institution, Washington, D. C.*
DANA, EDWARD S.....*Yale University, New Haven, Conn.*
DAVENPORT, CHARLES B.....*Cold Spring Harbor, N. Y.*
DAVIS, WILLIAM MORRIS.....*31 Hawthorn St., Cambridge, Mass.*
DAY, ARTHUR L.....*Geophysical Laboratory, Washington, D. C.*
DEWEY, JOHN.....*Columbia University, New York City.*
DICKSON, LEONARD E.....*University of Chicago, Chicago, Ill.*
DONALDSON, HENRY HERBERT.....*Wistar Institute of Anatomy, Philadelphia, Pa.*
ELKIN, WILLIAM L.....*Yale University Observatory, New Haven, Conn.*
FARLOW, W. G.....*Harvard University, Cambridge, Mass.*
FEWKES, JESSE WALTER.....*Bureau of American Ethnology, Washington, D. C.*
FLEXNER, SIMON.....*Rockefeller Institute, New York City.*
FOLIN, OTTO.....*Harvard Medical School, Boston, Mass.*
FRANKLIN, EDWARD CURTIS.....*Stanford University, California.*
FROST, EDWIN B.....*Yerkes Observatory, Williams Bay, Wis.*
GILBERT, GROVE K.....*U. S. Geological Survey, Washington, D. C.*
GOMBERG, MOSES.....*University of Michigan, Ann Arbor, Mich.*
GOOCH, FRANK A.....*Yale University, New Haven, Conn.*
GOODALE, GEORGE L.....*Harvard University, Cambridge, Mass.*
HAGUE, ARNOLD.....*U. S. Geological Survey, Washington, D. C.*
HALE, GEORGE E.....*Solar Observatory Office, Pasadena, Cal.*
HALL, EDWIN H.....*Harvard University, Cambridge, Mass.*
HALL, GRANVILLE STANLEY.....*Clark University, Worcester, Mass.*
HARPER, R. A.....*Columbia University, New York City.*
HARRISON, ROSS G.....*Yale University, New Haven, Conn.*
HASTINGS, CHARLES S.....*Yale University, New Haven, Conn.*
HAYFORD, JOHN F.....*Northwestern University, Evanston, Ill.*
HILLEBRAND, WILLIAM F.....*Bureau of Standards, Washington, D. C.*
HOLMES, WILLIAM H.....*U. S. National Museum, Washington, D. C.*
HOWARD, LELAND OSSIAN.....*U. S. Dept. of Agriculture, Washington, D. C.*
HOWELL, WILLIAM H.....*Johns Hopkins University, Baltimore, Md.*
IDDINGS, JOSEPH P.....*U. S. Geological Survey, Washington, D. C.*
JACKSON, CHARLES L.....*6 Boylston Hall, Cambridge, Mass.*
JENNINGS, HERBERT SPENCER.....*Johns Hopkins University, Baltimore, Md.*
KEMP, JAMES F.....*Columbia University, New York City.*
LEUSCHNER, ARMIN O.....*University of California, Berkeley, Cal.*
LEVENE, PHŒBUS AARON THEODOR.....*Rockefeller Institute, New York City.*
LEWIS, GILBERT N.....*University of California, Berkeley, Cal.*
LILLIE, FRANK RATTRAY.....*University of Chicago, Chicago, Ill.*
LINDGREN, WALDEMAR.....*Massachusetts Institute of Technology, Boston, Mass.*
LOEB, JACQUES.....*Rockefeller Institute, New York City.*
LUSK, GRAHAM.....*Cornell University Medical College, New York City.*
MALL, FRANKLIN P.....*Johns Hopkins University, Baltimore, Md.*
MARK, EDWARD L.....*109 Irving St., Cambridge, Mass.*
MAYER, ALFRED GOLDSBOROUGH.....*Carnegie Institution, Maplewood, N. J.*
MELTZER, SAMUEL JAMES.....*Rockefeller Institute, New York City.*
MENDEL, LAFAYETTE B.....*18 Trumbull St., New Haven, Conn.*
MENDENHALL, THOMAS C.....*329 North Chestnut St., Ravenna, Ohio.*
MERRIAM, C. HART.....*1919 16th St., Washington, D. C.*
MERRITT, ERNEST.....*Cornell University, Ithaca, N. Y.*
MICHAEL, ARTHUR.....*219 Parker St., Newton Center, Mass.*

MICHELSON, ALBERT A.....*University of Chicago, Chicago, Ill.*
MILLIKAN, ROBERT ANDREWS.....*University of Chicago, Chicago, Ill.*
MOORE, ELIAKIM H.....*University of Chicago, Chicago, Ill.*
MORGAN, T. H.....*Columbia University, New York City.*
MORLEY, EDWARD W.....*West Hartford, Conn.*
MORSE, EDWARD S.....*Salem, Mass.*
MORSE, HARMON N.....*Johns Hopkins University, Baltimore, Md.*
MOULTON, F. R.....*University of Chicago, Chicago, Ill.*
NICHOLS, EDWARD L.....*Cornell University, Ithaca, N. Y.*
NICHOLS, ERNEST F.....*Yale University, New Haven, Conn.*
NOYES, ARTHUR A.....*Massachusetts Institute of Technology, Boston, Mass.*
NOYES, WILLIAM A.....*University of Illinois, Urbana, Ill.*
OSBORN, H. F.....*American Museum of Natural History, New York City.*
OSBORNE, T. B.....*Agricultural Experiment Station, New Haven, Conn.*
OSGOOD, WILLIAM FOGG.....*Harvard University, Cambridge, Mass.*
PARKER, GEORGE H.....*16 Berkeley St., Cambridge, Mass.*
PEARL, RAYMOND.....*Maine Agricultural Experiment Station, Orono, Me.*
PICKERING, EDWARD C.....*Harvard College Observatory, Cambridge, Mass.*
PIRSSON, LOUIS V.....*41 Trumbull St., New Haven, Conn.*
PRUDDEN, T. MITCHELL.....*Columbia University, New York City.*
PUMPELLY, RAPHAEL.....*Gibbs Ave., Newport, R. I.*
PUPIN, MICHAEL I.....*Columbia University, New York City.*
RANSOME, FREDERICK LESLIE.....*U. S. Geological Survey, Washington, D. C.*
REID, H. FIELDING.....*Johns Hopkins University, Baltimore, Md.*
REMSEN, IRA.....*Johns Hopkins University, Baltimore, Md.*
RICHARDS, THEODORE W.....*Wolcott Gibbs Memorial Laboratory, Cambridge, Mass.*
ROSA, EDWARD B.....*Bureau of Standards, Washington, D. C.*
SARGENT, CHARLES S.....*Arnold Arboretum, Jamaica Plain, Mass.*
SCHLESINGER, FRANK.....*Allegheny Observatory, Allegheny, Pa.*
SCHUCHERT, CHARLES.....*Yale University, New Haven, Conn.*
SCOTT, WILLIAM B.....*Princeton University, Princeton, N. J.*
SMITH, ALEXANDER.....*Columbia University, New York City.*
SMITH, EDGAR F.....*University of Pennsylvania, Philadelphia, Pa.*
SMITH, ERWIN F.....*Bureau of Plant Industry, Washington, D. C.*
SMITH, THEOBALD.....*Princeton, N. J.*
STIEGLITZ, JULIUS.....*University of Chicago, Chicago, Ill.*
STORY, WILLIAM E.....*Clark University, Worcester, Mass.*
THAXTER, ROLAND.....*Harvard University, Cambridge, Mass.*
THOMSON, ELIHU.....*Swampscott, Mass.*
TRELEASE, WILLIAM.....*University of Illinois, Urbana, Ill.*
TROWBRIDGE, JOHN.....*Harvard University, Cambridge, Mass.*
VAN HISE, C. R.....*University of Wisconsin, Madison, Wis.*
VAN VLECK, E. B.....*University of Wisconsin, Madison, Wis.*
VAUGHAN, VICTOR CLARENCE.....*University of Michigan, Ann Arbor, Mich.*
VERRILL, A. E.....*47 Cedar Grove Ave., New London, Conn.*
WALCOTT, CHARLES D.....*Smithsonian Institution, Washington, D. C.*
WEBSTER, ARTHUR G.....*Clark University, Worcester, Mass.*
WELCH, WILLIAM H.....*807 St. Paul St., Baltimore, Md.*
WELLS, HORACE L.....*Yale University, New Haven, Conn.*
WHEELER, WILLIAM M.....*Harvard University, Cambridge, Mass.*
WHITE, DAVID.....*U. S. Geological Survey, Washington, D. C.*
WHITE, HENRY SEELY.....*Vassar College, Poughkeepsie, N. Y.*
WILLISTON, SAMUEL WENDELL.....*University of Chicago, Chicago, Ill.*

WILSON, EDMUND B.....*Columbia University, New York City.*
WOOD, HORATIO C.....*4107 Chester Ave., Philadelphia, Pa.*
WOOD, ROBERT W.....*Johns Hopkins University, Baltimore, Md.*
WOODWARD, ROBERT S.....*Carnegie Institution, Washington, D. C.*

SMITH, SIDNEY I.....*Yale University, New Haven, Conn.*

FOREIGN ASSOCIATES

ARRHENIUS, S. A.....*Nobelinstitut, Stockholm.*
BACKLUND, OSKAR.....*Astronomical Observatory, Pulkova.*
BAEYER, ADOLPH RITTER VON.....*Universität, Munich.*
BARROIS, CHARLES.....*Université. Lille.*
BRØGGER, W. C.....*Universitet, Christiania.*
CROOKES, SIR WILLIAM.....*London.*
DARBOUX, GASTON.....*Academy of Sciences, Paris.*
DESLANDRES, HENRI.....*Astrophysical Observatory, Meudon.*
DEWAR, SIR JAMES.....*University, Cambridge.*
FISCHER, EMIL.....*Chemisches Institut der Universität, Berlin.*
FORSYTH, A. R.....*Trinity College, Cambridge.*
GEIKIE, SIR ARCHIBALD.....*Haslemere, Surrey.*
GROTH, PAUL VON.....*Universität, Munich.*
HEIM, ALBERT.....*Zürich.*
HILBERT, DAVID.....*Universität, Göttingen.*
KAPTEYN, JOHN C.....*Rijks Universiteit, Groningen.*
KLEIN, FELIX.....*Universität, Göttingen.*
KÖSSEL, ALBRECHT.....*Heidelberg.*
KUSTNER, KARL FRIEDRICH.....*Bonn.*
LANKESTER, SIR E. RAY.....*South Kensington, London.*
LARMOR, SIR JOSEPH.....*St. Johns College, Cambridge.*
LORENTZ, HENDRIK ANTON.....*Rijks Universiteit, Leiden.*
OSTWALD, WILHELM.....*Grossbothen, bei Leipzig*
PAVLOV, IVAN PETROVITCH.....*Imperial Institute for Experimental Medicine, Petrograd.*
PENCK, ALBRECHT.....*Universität, Berlin.*
PFEFFER, WILHELM.....*Botanisches Institut der Universität, Leipzig.*
PICARD, CHARLES ÉMILE.....*Université, Paris.*
RAYLEIGH, LORD.....*University, Cambridge.*
RETZIUS, GUSTAV.....*Högskolan, Stockholm.*
RUTHERFORD, SIR ERNEST.....*University, Manchester.*
SCHUSTER, ARTHUR.....*Secretary of the Royal Society, London.*
SEELIGER, HUGO RITTER VON.....*Universität, Munich.*
THOMSON, SIR JOSEPH.....*University, Cambridge.*
VOLTERRA, VITO.....*Università, Rome.*
VRIES, HUGO DE.....*Universiteit, Amsterdam.*
WAALS, JOHANNES D. VAN DER.....*Amsterdam.*
WALDEYER, WILHELM.....*Universität, Berlin*
WOLF, MAX F. J. C.....*Heidelberg.*
WUNDT, WILHELM.....*Universität, Leipzig.*